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SPRING WHEAT



Adaptability
for
Illinois

Early seeding is essential to the success of spring wheat in Illinois. This is especially true in the central and southern parts of the state, where favorable weather lasts but a relatively short time.

Bulletin 483

UNIVERSITY OF ILLINOIS • AGRICULTURAL EXPERIMENT STATION

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Spring Wheat: Adaptability for Illinois

By G. H. DUNGAN and W. L. BURLISON¹

ADVERSE WEATHER conditions for winter wheat often cause growers to consider sowing spring wheat in a predominantly winter-wheat area. This happens especially when winter wheat freezes out, as it did on a wide scale in 1927-28, and when wet weather in the fall prevents the seeding of winter wheat, as it did in 1941.

Under normal conditions the acreage of spring wheat in Illinois is limited and is confined mainly to the northeastern part of the state (Fig. 1). During the fifteen years 1927-1941 the acreage in the state sowed to spring wheat was only about 4.4 percent of that sowed to winter wheat.

According to the state average, spring wheat yielded 16.8 bushels an acre compared with 17.6 bushels for winter wheat during 1927-1941. State-wide average yields do not, however, show the comparative producing ability of these two grains nearly so well as experimental plantings on the same field. Such tests have been made in northern, central, and southern Illinois (Table 1). On the northern Illinois experiment field winter and spring wheats have been grown in the same rotation for fifteen years. In central Illinois the two kinds of wheat have not been grown in the same rotation but they have been grown on soils of similar productive capacity. At Alhambra in southwestern Illinois, spring and winter wheat have been grown in the same rotation thru five seasons.

Even in northern Illinois, where the crop is best adapted, spring wheat produced only about two-thirds as much as winter wheat. Its yield in central Illinois was slightly better altho it was only three-fourths that of winter wheat. In southern Illinois, which is entirely outside the spring-wheat area, the yield of spring wheat was less than one-third that of winter wheat.

EARLY SEEDING ESSENTIAL

Spring wheat needs to make its growth largely before hot weather sets in. Also the relatively short days of early spring favor stooling. Early seeding is therefore essential to the success of this crop, espe-

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cially in the central and southern parts of the state, where weather favorable for this crop lasts but a relatively short time. Since spring wheat can endure a great deal of cold there is little, if any, danger from low temperatures when seeding is done especially early. Occasionally a heavy rain or snow following early seeding may puddle the

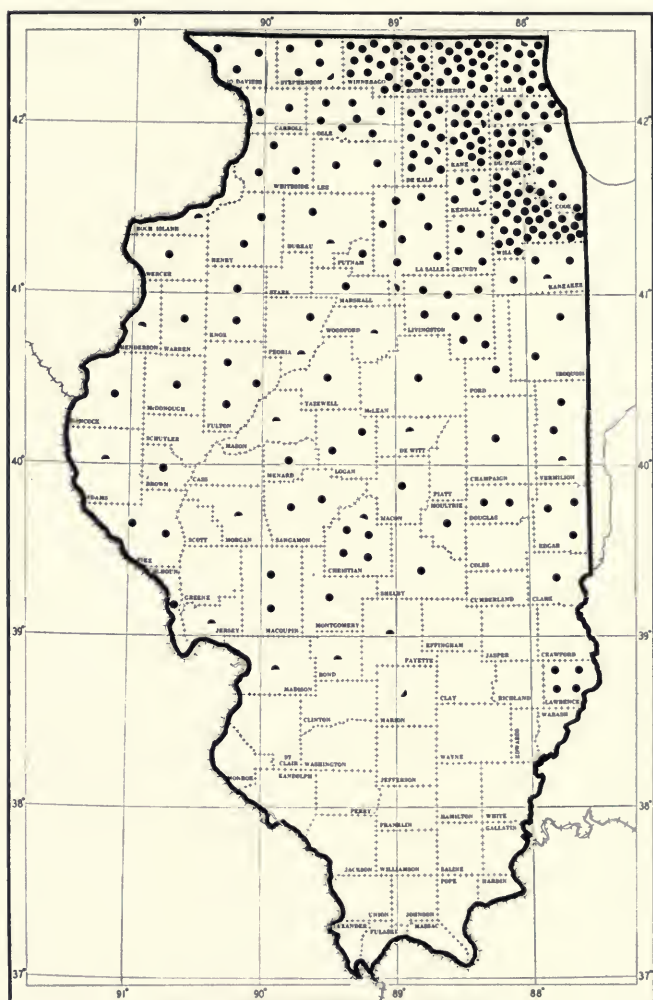


Fig. 1.—Acreage of spring wheat in Illinois. Each complete dot represents 100 acres planted to spring wheat as an average for 1939 and 1940. (Figures were secured from the Illinois Cooperative Crop Reporting Service, Illinois Department of Agriculture cooperating with the U. S. Department of Agriculture.)

TABLE 1.—YIELDS OF SPRING AND WINTER WHEAT ON EXPERIMENT FIELDS IN NORTHERN, CENTRAL, AND SOUTHERN ILLINOIS

Location of field	Years compared	Average acre-yield		Yield of spring wheat in relation to winter wheat
		Spring wheat	Winter wheat	
		<i>bu.</i>	<i>bu.</i>	<i>perct.</i>
Northern Illinois (DeKalb, Mt. Morris)...	15 (1927-41)	18.4	28.1	65.5
Central Illinois (Urbana).....	15 (1927-41)	25.1	33.4*	75.1
Southern Illinois (Alhambra).....	5 (1937-41)	7.4	25.6	28.9

*This includes 1927-28, when the crop was completely winterkilled.

soil to a considerable depth and make emergence so difficult that poor stands result.

When weather and soil conditions do not permit early seeding it is advisable to substitute some other crop for spring wheat, especially in central and southern Illinois, because there is danger of a complete crop failure. Even when delayed seeding does not result in a crop failure it lowers the yield and quality of the grain, as has been shown by tests made at Urbana during 1918-1922 (Table 2). A delay of eleven days after March 4 reduced the yield 4.2 bushels, or about 16 percent. About one month's delay—from March 4 to April 8—reduced the yield 7.8 bushels, or 29 percent. Holding off seeding until after the middle of April sometimes results in a complete crop failure or a yield so low that the grower gets little more back than the amount of seed he sowed.

To illustrate the importance of early seeding an experience on the Alhambra field in 1928 may be cited. Since winter wheat had failed spring wheat was substituted. On March 2, Illinois 1 was broadcast without any further seedbed preparation. At that time the soil was

TABLE 2.—DATE OF SEEDING SPRING WHEAT AS IT AFFECTS YIELD AND QUALITY OF GRAIN AT URBANA, 1918-1922

Average date of seeding	Number of trials	Acre-yield	Test weight per bushel	Heads infected with scab*
		<i>bu.</i>	<i>lb.</i>	<i>perct.</i>
March 4.....	8	26.7	57.7	1.5
March 15.....	8	22.5	56.4	3.4
March 26.....	6	19.1	55.4	6.5
April 8.....	5	18.9	56.1	14.8
April 23.....	4	10.3	....	....

*Data on scab infection were obtained in 1918 only.

thawed to a depth of about 2 inches and was excessively moist. In fact the surface was so soft that the impact of the wheat kernels as they fell from the broadcast seeder was sufficient to embed them in the soil. Hence a tillage implement was not used to cover the seed. A



Fig. 2.—A good seedbed in which spring wheat has been drilled. The ground was prepared by plowing cornstalk land in the fall and by double-disking and harrowing before the seed was drilled. (*Photographed April 5, 1940*)

fair stand was obtained and a crop averaging 15.4 bushels an acre was harvested. The results indicate that, with early seeding, a fair yield of spring wheat may be secured even in southern Illinois, where the crop is not considered to be adapted.

SEED 6 TO 8 PECKS AN ACRE

On the Illinois experiment fields spring wheat was seeded at approximately 8 pecks per acre. Considerable variation from this rate does not greatly affect yield. Since early seeding gives the plants more opportunity to tiller it can perhaps be done at a slightly lower rate than later seeding.

To control seedling blight and stinking smut all seed should be treated before sowing with some good organic mercury dust.¹

¹See Illinois Circular 444, "Seed Treatments for Farm Crops," by Benjamin Koehler, 1936.

SOW WITH DRILL IN GOOD SEEDBED

When spring wheat follows corn in the rotation, as is usually the case, the cornstalks should be plowed under well, preferably in the fall if this conforms to good soil-conservation practice in the area. Plowing not only incorporates the stalk residues in the soil but it is also an important step in the control of the scab disease of cereals and the European corn borer. Fall-plowed cornfields and soybean stubble require only double-disking and harrowing in the spring to fit them for the drill.

Ordinarily drilling is preferred to broadcasting because drilling conserves seed, secures its even distribution, and puts it at a uniform depth (Fig. 2). However, in order to get wheat seeded early, it may at times be advisable to sow with an endgate seeder and cover the seed with a disk and harrow. When the seed is broadcast, the rate should be increased to 9 or 10 pecks an acre.

CHOOSE BEST ADAPTED VARIETY

To find the varieties of spring wheat best suited to different parts of the state, variety trials have been conducted annually by the Illinois Station at three locations. Data on the yield in the different sections are summarized in Tables 3, 4, and 5, and a description of the varieties grown in the yield tests is given in Table 6.

On the basis of these tests Sturgeon, Progress, and Illinois 1 are recommended for the entire state.

Northern Illinois. Of the five varieties yielding highest on the northern experiment fields at DeKalb and Mt. Morris, Progress, Sturgeon, and Illinois 1 are recommended. Garnet and Triumph, tho high yielding, produce grain low in bread-making quality.

Four varieties—Merit, Premier, Rival, and Pilot—which have been tested for two years only, show considerable promise. They have yielded above the average and are resistant to stem rust. With the exception of Merit they are also resistant to leaf rust.

Central Illinois. Varieties that have produced above the average thru three or more years' tests at Urbana in central Illinois are: Triumph, General San Martin, Garnet, White Australian, Reward, Purdue W38, Sturgeon, Progress, and Illinois 1. Purdue W38 is resistant to the scab disease and to attacks of the spring brood of the hessian fly.

Rival and Premier, varieties tested for two years only, seem to be promising for this area.

TABLE 3.—NORTHERN ILLINOIS: YIELDS OF VARIETIES OF SPRING WHEAT AT DEKALB AND MT. MORRIS, 1927-1941
(Bushels per acre; date of seeding indicated under year)

Rank	Variety	Bushels above (+) or below (-) average of all varieties ^a	Varieties grown three or more years														Varieties grown two years only																				
			Average yield	1927 Mar. 18	1928 Apr. 20	1929 Apr. 9	1930 Apr. 8	1931 Apr. 9	1932 Apr. 12	1933 Apr. 13	1934 ^b Apr. 10	1935 Apr. 9	1936 Apr. 16	1937 ^c May 11	1938 Apr. 13	1939 Apr. 7	1940 Apr. 5	1941 Apr. 22																			
1	Garnet.....	+4.9	24.4	20.6	36.3	25.7	32.3	16.6	14.0	15.9	5.0	10.8	21.4	3.9	15.6	9.9	.....	.....	.....															
2	Progress.....	+2.2	19.3	27.2	31.9	27.8	34.1	20.1	21.0	20.6	3.4	14.3	21.5	5.7	19.1	9.1	.....	.....	.....															
3	Triumph.....	+2.0	11.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.6	17.0	9.3	38.0	20.7	.....																	
4	Sturgeon.....	+1.7	18.7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.0	15.3	9.8	33.8	18.6	.....																	
5	Illinois 1 (Station).....	+1.4	19.5	.....	32.6	29.3	30.7	16.4	20.8	20.6	2.7	16.3	24.2	5.6	20.1	9.5	27.2	18.4	.....																	
6	General San Martin.....	— .1	16.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.8	15.3	9.6	.....	.....	.....															
7	Illinois 1 (Mann).....	— .1	9.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	14.0	14.9	6.6	.....	.....	.....															
8	Thatcher.....	— .2	10.7	.....	.....	.....	.....	.....	.....	.....	4.6	10.1	14.2	2.7	17.1	9.7	30.0	17.1	.....																	
9	Purdue W38.....	— .9	15.3	.....	.....	.....	.....	.....	.....	.....	2.9	10.7	21.6	2.5	9.9	8.4	.....	.....	.....															
10	Konar.....	— 1.0	10.8	.....	.....	.....	.....	.....	.....	.....	19.5	10.7	21.6	.....	.....	7.3	32.2	18.3	.....																	
11	Renown.....	— 1.3	19.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....		
12	Reward.....	— 1.7	13.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....		
13	Marquis.....	— 2.7	20.5	17.2	27.0	23.2	24.2	16.7	14.5	.....	4.3	12.1	19.2	.....	.....	.....	.....	.....	.....												
14	White Australian.....	— 2.8	21.6	20.2	24.2	24.6	26.1	12.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....							
15	Comet.....	— 2.9	4.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....		
16	Kota.....	— 4.4	22.0	24.5	18.4	20.9	24.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....						
Merit.....																				.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Premier.....																				.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rival.....																				.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pilot.....																				.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																			
																																

^aGrown the same years. ^bLow yields in 1934 are believed to have been caused by abnormally low rainfall during April and May. ^cLate seeding, for which wet weather was responsible, and heavy damage from stem rust were factors that made for low yields in 1937. Note that Thatcher had a marked advantage over other varieties because of its resistance to stem rust.

TABLE 4.—CENTRAL ILLINOIS: YIELDS OF VARIETIES OF SPRING WHEAT AT URBANA, 1927-1941
(Bushels per acre; date of seeding indicated under year)

Rank	Variety	Bushels above (+) or below (-) average of all varieties ^a	Varieties grown three or more years																	
			Average yield	1927 Feb. 22	1928 Mar. 6	1929 Mar. 22	1930 Mar. 6	1931 Feb. 28	1932 Feb. 29	1933 Mar. 2	1934 ^b Mar. 15	1935 Mar. 16	1936 Mar. 26	1937 Mar. 19	1938 Apr. 5	1939 Mar. 20	1940 Mar. 22	1941 Mar. 20		
1	Triumph.....	+4.5	20.0	...	...	...	...	...	...	...	...	...	...	26.0	17.5	16.4	...	...	...	...
2	General San Martin..	+3.6	23.4	...	...	...	...	...	...	...	...	...	...	26.8	19.0	15.7	...	27.7	...	27.8
3	Garnet.....	+2.1	27.0	34.6	31.2	31.5	35.8	24.2	26.7	7.0	19.3	35.7	...	...	...	...	...	...	...	...
4	White Australian....	+1.9	29.6	33.4	30.4	28.3	40.5	21.6	...	...	...	...	...	...	...	...	...	...	...	...
5	Reward.....	+1.3	24.4	...	...	...	36.3	22.7	30.4	5.2	19.6	32.3	...	...	...	...	...	...	...	...
6	Purdue W38.....	+1.0	20.8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	Sturgeon.....	+1.6	22.0	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	Progress.....	+6	23.4	32.4	28.3	28.9	32.1	27.7	29.3	2.1	19.3	34.5	21.1	11.7	16.7	30.2	24.1	...	...	...
9	Illinois 1 (Station)...	+3	23.5	32.2	27.8	32.0	29.9	25.9	28.4	2.5	16.5	33.1	20.1	11.5	14.6	28.1	23.5	...	...	...
10	Komar.....	-2	18.2	...	...	...	...	...	33.5	2.4	15.0	33.1	23.0	10.4	10.3	...	...	...	...	...
11	Illinois 1 (Mann)....	-4	15.1	...	...	...	...	...	...	1.2	12.5	31.2	30.9	9.9	5.1	23.1	24.8	...	...	...
12	Thatcher.....	-1.9	16.3	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	Renown.....	-3.5	17.7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	Marquis.....	-4.3	23.4	25.0	26.5	29.6	25.6	15.3	...	...	...	...	...	...	...	...	...	...	...	...
15	Kota.....	-6.3	21.4	23.2	16.1	28.2	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	Comet.....	-6.9	8.6	...	...	...	...	...	...	...	...	...	...	14.6	5.8	5.4	...	...	...	...
Varieties grown two years only																				
	Rival.....	+2.6	28.8	...	...	...	...	...	...	...	...	...	...	...	...	...	27.7	29.8	...	...
	Premier.....	+1.2	27.4	...	...	...	...	...	...	...	...	...	...	...	...	...	27.4	27.3	...	...
	Merit.....	-5	25.7	...	...	...	...	...	...	...	...	...	...	...	...	...	26.7	24.7	...	...
	Pilot.....	-2.1	24.1	...	...	...	...	...	...	...	...	...	...	...	...	...	25.7	22.5	...	...

^aGrown the same years. ^bAbnormally low rainfall and high temperatures during April and May caused low yields in 1934.

TABLE 5.—SOUTHERN ILLINOIS: YIELDS OF VARIETIES OF SPRING WHEAT
AT ALHAMBRA, 1937-1941
(Bushels per acre; date of seeding indicated under year)

Rank	Variety	Bushels above (+) or below (-) average of all varieties*	Average yield	1937 Apr. 13	1938 Apr. 21	1939 Mar. 22	1940 Apr. 1	1941 Mar. 25
1	General San Martin.....	+3.3	16.6	...	3.4	10.7	19.1	...
2	Illinois 1 (Station).....	-.4	5.4	8.9	1.8	...	...	...
3	Sturgeon.....	-2.0	6.5	...	...	4.2	13.6	1.7

*Grown the same years.

Southern Illinois. Since all varieties of spring wheat are hard wheats and do not possess milling and baking properties comparable to the soft red winter wheats grown extensively in the south central and southern parts of the state, there is serious objection to growing spring wheat in this area. Therefore only a limited number of trials of spring-wheat varieties have been made on the Alhambra field in southern Illinois (Table 5).

Even tho General San Martin is much higher yielding in this area than other varieties, it is not recommended because of the extremely low quality of its grain. Illinois 1 and Progress approach more nearly the type of soft winter wheat than any spring wheats that have been tested by this Station.

CONSIDER PROBABLE INSECT DAMAGE

Chinch bugs are not so likely to infest spring wheat as barley but they prefer it to oats. If spring wheat is grown in areas where chinch bugs are abundant, it is liable to severe damage.

Altho spring wheat is not believed to be more susceptible to injury from the hessian fly than winter wheat is, the same infestation will cause more damage to spring wheat because the plants are smaller at the time when the spring brood is active. Therefore spring wheat should not be grown next to a badly infested field of winter wheat.

(For summary of recommendations see page 540.)

TABLE 6.—CHARACTERISTICS OF 19 VARIETIES OF SPRING WHEAT TESTED IN ILLINOIS

Variety	Agency originating	Parent variety	Yield	Time of maturity	Grain quality for bread	Lodging resist- ance	Resistance to—		Color of glumes	Type of heads
							Stem rust	Scab		
Comet.....	Mont. Station and USDA	(Marquis X Hard Federation)	Low	Medium	Good	Good	Poor	Poor	White	Awless
Garnet.....	Cent. Exp. Farm, Canada	(Preston A X Riga M)	High	Early	Medium	Good	Poor	Medium	White	Awless
General San Martin.....	Argentina	. . .	High	Early	Very poor	Medium	Poor	Poor	Deep bronze	Awned
Illinois 1.....	Ill. Station	Java	High	Medium	Good	Poor	Poor	Good	White	Awned
Komar.....	N. Dak. Station	(Kota X Marquis)	Medium	Medium	Good	Medium	Good	Poor	White	Awned
Kota.....	N. Dak. Station	Monad, durum*	Low	Late	Excellent	Poor	Good	Good	White	Awned
Marquis.....	Cent. Exp. Farm, Canada	(H. Red Calcutta X Red Fife)	Low	Medium	Excellent	Good	Poor	Poor	White	Awless
Merit.....	USDA and N. Dak. Station	(H-44 X Ceres)	High	Medium	Good	Good	Good	Medium	White	Awned
Pilot.....	USDA and N. Dak. Station	(Hope X Ceres)	Medium	Medium	Excellent	Medium	Good	Medium	White	Awned
Premier.....	N. Dak. Station	Ceres X (Hope-Florence) X RL 625	High	Medium	Good	Good	Good	Medium	White	Awned
Progress.....	Wis. Station	Java	High	Medium	Poor	Medium	Good	Medium	White	Awned
Purdue W38.....	Ind. Station	Illinois 1	Medium	Medium	Good	Medium	Medium	Good	White	Awless
Renown.....	Dominion Lab., Winnipeg	(Reward X H 44-24)	Low	Medium	Medium	Good	Good	Medium	White	Awless
Reward.....	Exp. Farm, Ottawa, Canada	(Marquis X Prelude)	Medium	Early	Good	Good	Good	Medium	White	Awless
Rival.....	N. Dak. Station.....	Ceres X (Hope-Florence)	High	Medium	Excellent	Good	Medium	Medium	White	Awned
Sturgeon.....	Wis. Station	(Progress X Marquis)	High	Medium	Good	Medium	Medium	Medium	White	Awned
Thatcher.....	Minn. Station	(Marquis-Lumillo X Marquis-Kanred)	Low	Early	Excellent	Good	Excellent	Medium	White	Awless
Triumph (Klein C 170) .	Argentina	. . .	High	Early	Poor	Medium	Poor	Poor	Red	Awned
White Australian.....	Australia	White Lammis	Medium	Late	Good	Good	Poor	Poor	White	Awless

*Kota was separated out of a durum wheat but it is not a durum type.

SUMMARY OF RECOMMENDATIONS

1. In a rotation spring wheat usually follows corn, soybeans, or winter wheat that has been winterkilled or drowned out. If it follows corn, the land should be plowed by late fall or early winter, and care should be taken to cover all stalks. Double-disking and harrowing just before drilling are the only preparations needed for a seedbed on plowed cornstalk land, soybean stubble, or on land where winter cereals have failed.

2. Choose a variety that gives a high yield regularly and produces grain of good quality. The highest yielding varieties are not always best because they often possess some serious fault which more than offsets their superiority in yield. The best all-round varieties for Illinois include Sturgeon, Progress, and Illinois 1. Rival and Premier show considerable promise but they have been tested for two years only.

3. Treat the seed with Ceresan or some other reliable material to control seedling blight and covered smut.

4. Seed spring wheat as early as weather and soil conditions will permit. The seedlings can endure a great deal of cold.

5. Sow the seed with a drill and use 6 to 8 pecks to the acre. If it is not possible to use a drill, the seed may be broadcast, but the rate should be increased to 9 or 10 pecks an acre.

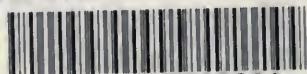
6. Harvest the grain when it has fully matured. It may be cut with a binder and threshed with a separator or it may be harvested with a combine.

7. Spring wheat should not be grown in areas where chinch bugs are abundant. Also it should not be seeded next to fields of winter wheat that are badly infested with hessian fly.

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